

ASHRAE ANNUAL MEETING

JUNE 28, 2016, Marriott Grand Hotel, St. Louis, Missouri, USA

Subject: TC 9.11 Energy Efficiency Subcommittee Meeting

Thank you to all for attending the TC 9.11 Cleanroom Energy Efficiency Subcommittee Meeting

Committee Members in Attendance

Mitch Swann
Kishor Khankari
Vijay Vijayakumar
Mike Amstadt
Art Giesler
Gary Shamshoian
Phil Naughton

Visitors

Rieson Chude
Susan Nagel
Den Low

Meeting Notes

The Cleanroom Energy Efficiency Technical Bulletin (aka White Paper) has been issued to the TC and a letter ballot will be issued for TC vote to approve

A discussion was presented by Phil Naughton indicating previous technical bulletin topics that the committee has previously generated, see list below.

Discussion focused on clean room benchmark data and the lack of data from cleanroom applications in pharmaceutical facilities. Phil Naughton shared the data from Semiconductor benchmark survey as well as LBNL/PGE High Tech survey from 2001/2002.

In line with the adage *if you cannot measure it you cannot manage it*, the idea of soliciting facilities data for cleanroom that impact energy efficiency and energy consumption, there was consensus that it would be helpful to either create a new RTAR to survey cleanroom owners on the energy efficiency topics or to seek input from the companies participating in the RP-1399 Project. Once an agreed to list of survey questions was created, Mitch Swann (RP-1399 PMS Chair) would investigate with PI the possibility of collecting information from RP-1399 participants.

Phil Naughton suggested following similar survey questions used in Semiconductor facility energy survey. Understanding where and how the energy is used within a clean space may provide an opportunity for energy efficiency

- Typical Plug Load or Process Equipment Load within cleanroom, w/ft²
- Typically Lighting levels, w/ft²
- Typical cleanroom recirculation fan total static pressure

- Typical cleanroom recirculation fan size (e.g. central station fan or FFU)
- Typical fan static pressure for other fans serving clean spaces such as fresh air units (AKA Make-up air or Outside air Units)
- Typical HEPA/ULPA filter pressure drop
- Typical quantity of reheat energy, w/ft² or Kbtu/ft³, or magnitude of reheat energy (degrees of reheat)

Susan Nagel was going to investigate typical pharma cleanroom design criteria regarding the same categories above used by pharma A/E firm.

Action Items:

Interested members and visitors should provide feedback and best approach to collect this information Phil Naughton will schedule a subcommittee meeting for August time frame to discuss how feedback and next steps

Other Technical Bulletin Ideas from past subcommittee meetings:

- Focus on fundamentals, where does the energy go in a cleanroom and how are design elements affecting this?
- How can ASHRAE encourage cleanroom energy benchmarking?
- Energy savings should not compromise product quality or how to fine tune energy efficient designs without sacrificing product quality
- Do cleanrooms need an energy performance metric - creation of cleanroom PUE
- Benchmarking based upon thermodynamic efficiency, energy intensity.
- Deploy real time energy monitoring to ensure energy efficiency goals are validated and maintained.
- How to gain acceptance of varying air change rates by regulators?
- Exploring possibilities of increasing "Recovery Time".
- Developing "ventilation standard" like ASHRAE 62.1 for various processes / activities in cleanrooms
- possibilities of minimizing "pressure differential" to reduce "Ex-filtrations/air leakages" and its impact on HVAC due to "make-up air"

Please respond with any corrections or omissions.

Minutes transcribed by:

Phil Naughton